

THAT WHICH IS CLAIMED IS:

1. A system for forming a pattern on plain or holographic metallized film or hot stamp foil having a metallized surface comprising:

- an ink jet printhead comprising a plurality
5 of ink jet channels and respective ink jets that receive an etchant or etchant-resistant mask material for ejecting the etchant or etchant-resistant mask material through respective ink jets onto the metallized surface; and
10 a controller operatively connected to the ink jet printhead for individually and digitally controlling ejection of one of an etchant or etchant-resistant mask material through respective ink jets in a programmed manner for ink jet printing on the
15 metallized surface a pattern of etchant or etchant-resistant mask to form subsequently an item specific pattern.

2. A system according to Claim 1, and further comprising an etchant into which the metallized surface is exposed for etching the metallized surface when an etchant-resistant mask has been ink jet
5 printed.

3. A system according to Claim 1, and further comprising a printhead mounting assembly that mounts the ink jet printhead for angled movement relative to the metallized surface of the plain or
5 holographic metallized film or hot stamp foil for changing the resolution of the applied pattern of etchant or etchant-resistant mask based on the angle of the ink jet printhead.

4. A system according to Claim 1, wherein the ink jet printhead comprises a Drop On Demand (DOD) printhead.

5. A system according to Claim 4, wherein said Drop On Demand printhead comprises a piezoelectric ink jet printhead.

6. A system according to Claim 1, wherein said ink jet printhead comprises a Continuous Ink Jet printhead (CIJ).

7. A system according to Claim 1, wherein said controller comprises programmable logic controller (PLC).

8. A system according to Claim 1, wherein said metallized surface comprises aluminum and said etchant comprises NaOH.

9. A demetallizing system for plain or holographic metallized film or hot stamp foil comprising:

- 5 a film advancing mechanism for advancing a plain or holographic metallized film or hot stamp foil having a metallized surface along a predetermined path of travel into a demetallization station;
- an ink reservoir for holding ink that includes one of an etchant or etchant-resistant mask
10 material;
- an ink jet printhead located at the demetallization station and comprising a plurality of ink jet channels and respective ink jets that receive the ink and ejects the ink through respective ink jets
15 onto the metallized surface;

a controller operatively connected to the ink jet printhead for individually and digitally controlling ejection of ink through respective ink jets in a programmed manner for ink jet printing on the
20 metallized surface a pattern of ink that includes one of the etchant or etchant-resistant mask material for subsequently forming an item specific pattern.

10. A system according to Claim 9, and further comprising an etchant bath for etching the metallized surface when an etchant-resistant mask has been ink jet printed.

11. A system according to Claim 10, and further comprising a washer located along the predetermined path of travel for washing excess ink and any etchant from the metallized surface after the item
5 specific pattern has been etched onto the metallized film.

12. A system according to Claim 9, and further comprising a printhead mounting assembly that mounts the ink jet printhead for angled movement relative to the metallized surface of the metallized
5 film for changing the resolution of the applied pattern of etchant or etchant-resistant mask based on the angle of the ink jet printhead.

13. A system according to Claim 9, wherein the ink jet printhead comprises a Drop On Demand (DOD) printhead.

14. A system according to Claim 13, wherein said ink jet printhead comprises a piezoelectric ink jet printhead.

15. A system according to Claim 9, wherein said ink jet printhead comprises a Continuous Ink Jet printhead (CIJ).

16. A system according to Claim 9, wherein said controller comprises programmable logic controller (PLC).

17. A currency bill comprising:
a currency substrate;
a patterned, bill specific metallization layer adhesively applied over a portion of a surface of
5 the currency substrate, wherein the patterned, bill specific metallization layer had been ink jet patterned with an ink having an etchant or etchant-resistant mask and etched to form a bill specific metallization layer having a pattern; and
10 a substantially translucent protective layer that had received the metallization layer thereon.

18. A currency bill according to Claim 17, and further comprising a hologram or kinegram formed at the pattern.

19. A method of forming an item specific pattern on a plain or holographic metallized film or hot stamp foil having a metallized surface and comprising the steps of:
5 supplying one of an etchant or etchant-resistant mask material to an ink jet printhead comprising a plurality of ink jet channels and respective ink jets, each individually and digitally controlled by a controller for ejecting one of the
10 etchant or etchant-resistant mask material through respective ink jets in a programmed manner; and

controllably ink jet printing on the metallized surface a pattern of etchant or etchant-resistant mask.

20. A method according to Claim 19, and further comprising the step of etching the metallized surface into an item specific pattern by exposing the metallized surface having an etchant-resistant mask to
5 an etchant.

21. A method according to Claim 19, and further comprising the step of angling the ink jet print head at a predetermined angle relative to the metallized surface for changing the resolution of the
5 applied pattern of etchant or etchant-resistant mask.

22. A method according to Claim 19, and further comprising the step of providing the ink jet head as a Drop On Demand (DOD) ink jet printhead.

23. A method according to Claim 22, and further comprising the step of providing the ink jet printhead as a piezoelectric ink jet printhead.

24. A method according to Claim 19, and further comprising the step of providing the ink jet printhead as a Continuous Ink Jet printhead (CIJ).

25. A method of demetallizing comprising the steps of:

advancing a plain or holographic metallized film or hot stamp foil having a metallized surface into
5 a demetallization station;

supplying ink with one of an etchant or etchant-resistant mask material to an ink jet printhead

located at the demetallization station, said ink jet
printhead having a plurality of ink jet channels and
10 respective ink jets each individually and digitally
controlled by a controller for ejecting ink through
respective ink jets in a programmed manner; and

ink jet printing on the metallized surface at
the demetallization station an item specific pattern of
15 ink and subsequently etching based on the item specific
pattern of ink.

26. A method according to Claim 25, and
further comprising the step of etching the metallized
surface into an item specific pattern by the ink and
etchant or subsequently exposing the metallized surface
5 having the etchant-resistant mask thereon to an
etchant.

27. A method according to Claim 25, and
further comprising the step of advancing the metallized
film at a predetermined rate through the
demetallization station for ink jet printing the item
5 specific pattern of ink at a predetermined resolution.

28. A method according to Claim 25, and
further comprising the step of washing any excess ink
and etchant from the metallized film after ink jet
printing.

29. A method according to Claim 25, and
further comprising the step of angling the ink jet
print head at a predetermined angle relative to the
metallized surface for changing the resolution of the
5 ink applied into an item specific pattern.

30. A method according to Claim 25, and further comprising the step of providing the ink jet head as a Drop On Demand (DOD) ink jet printhead.

31. A method according to Claim 30, and further comprising the step of providing the ink jet printhead as a piezoelectric ink jet printhead.

32. A method according to Claim 25, and further comprising the step of providing the ink jet printhead as a Continuous Ink Jet print head (CIJ).

33. A method according to Claim 25, and further comprising the step of controlling the ink delivery to the ink jets from a programmable logic controller (PLC).

34. A method of forming an item specific pattern on a plain or holographic flexible substrate comprising the steps of:

- 5 applying a release layer onto a polymer film;
- applying a substantially translucent
- protective coating over the release layer;
- metallizing the protective coating to form a metallized surface on the protective coating;
- demetallizing a portion of the metallized
- 10 surface into a pattern by supplying one of an etchant or etchant-resistant mask to an ink jet printhead having respective ink jets that are each individually and digitally controlled by a controller, and ink jet printing on the metallized surface one of a pattern of
- 15 etchant or etchant-resistant mask;
- etching the metallized surface into an item specific pattern by the ink jet printed etchant or a subsequently applied etchant;

applying an adhesive onto the metallized
20 surface formed in the item specific pattern; and
engaging a substrate with the adhesive and
breaking the release layer such that the protective
coating and metallized layer having the item specific
pattern is adhesively applied onto the substrate.

35. A method according to Claim 34, wherein
the substrate comprises flexible paper.

36. A method according to Claim 35, wherein
the substrate comprises a currency bill.

37. A method according to Claim 34, and
further comprising the step of applying heat to the
adhesive for activating the adhesive.

38. A method according to Claim 34, and
further comprising the step of providing the ink jet
head as a Drop On Demand (DOD) ink jet printhead.

39. A method according to Claim 38, and
further comprising the step of providing the ink jet
printhead as a piezoelectric ink jet printhead.

40. A method according to Claim 34, and
further comprising the step of providing the ink jet
printhead as a Continuous Ink Jet printhead (CIJ).